



Boeing Technology
Phantom Works

5th Integrated-CNS Technologies Conference & Workshop

Global Communications, Navigation, & Surveillance Systems Program – Progress and Plans

Chip Meserole

May 3, 2005



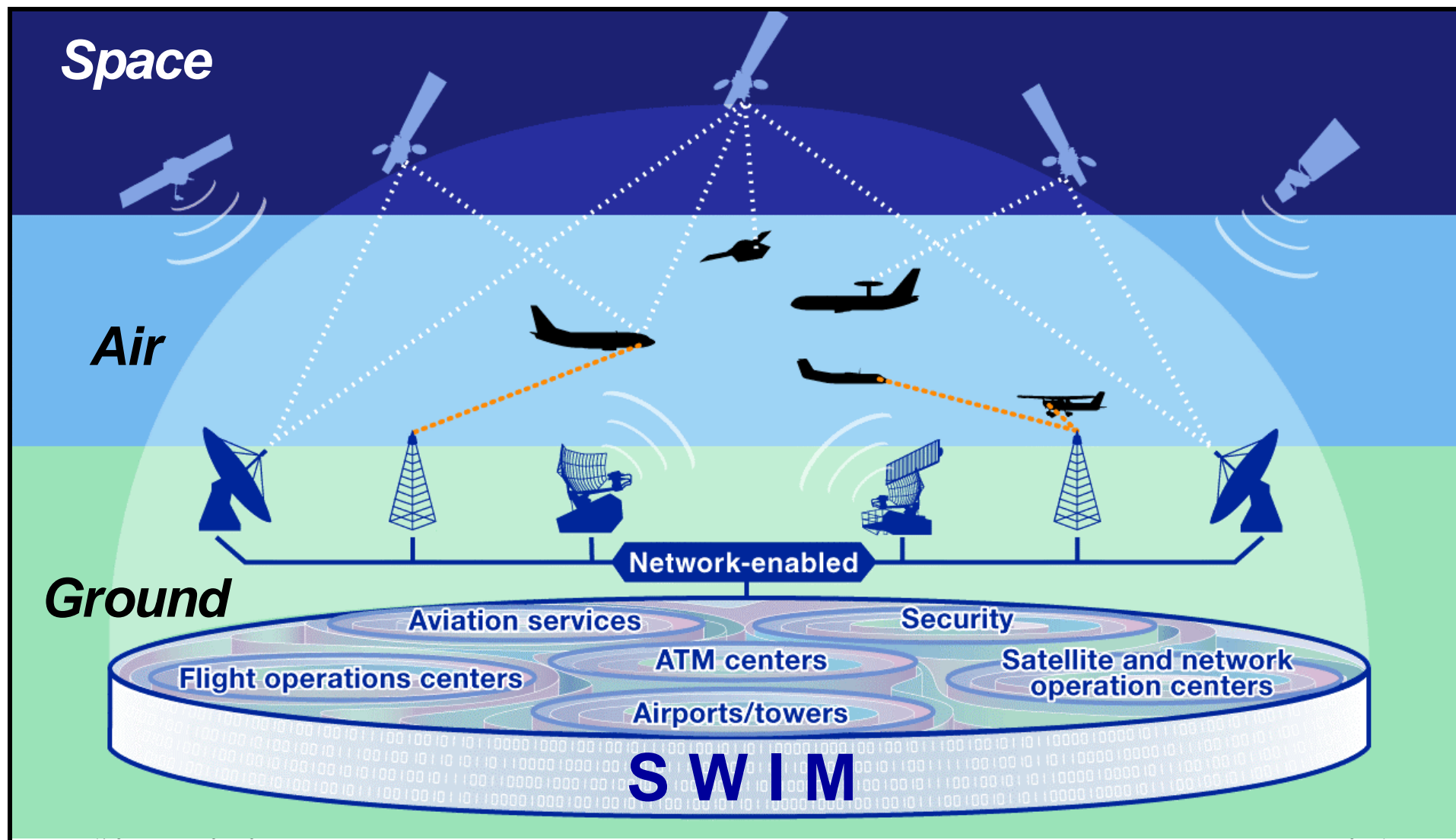


GCNSS Program

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Advanced Air Traffic Management

Global Communications, Navigation, & Surveillance Systems (GCNSS)



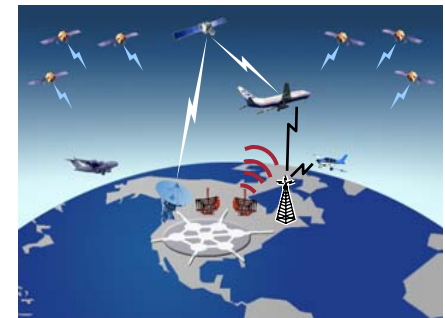


Program Synopsis

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Advanced Air Traffic Management

- **FAA contract to Boeing**
 - Phase I – July 2002 to Aug 2004
 - Phase II – Sept 2004 to Aug 2005
 - Security Demonstration (JPDO) – Jan to Oct 2005
- **Focus**
 - SWIM — System Wide Information Management
 - Investment analysis and transition plan
 - Multi-agency common situation awareness
- **Program elements**
 - Systems engineering & system architecture
 - Testbed
 - Demonstration



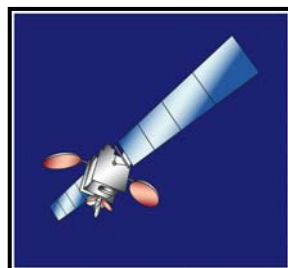


ATM Transformation Vision

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***Precision flight
anywhere***

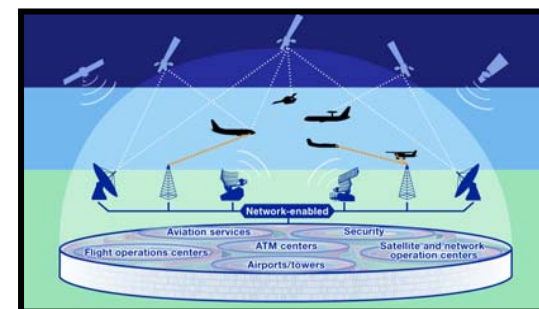


Satellite-enhanced CNS

***Capacity,
Safety & Efficiency***



Management by trajectory



**Information
Infrastructure**

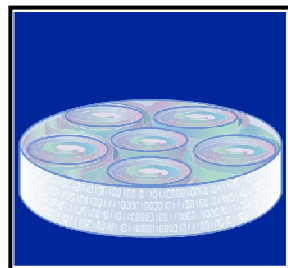
Enables

**Network Enabled
Operations**

Create

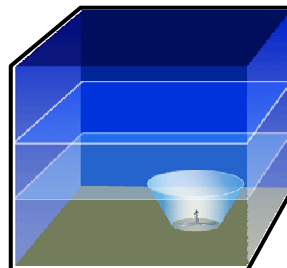
**Next Generation Air
Transportation System**

SWIM



***Precision common
awareness***

Dynamic seamless airspace



***Agility,
Security & Economy***

- 3X+ capacity
- Economy stimulus
- \$10-30B/yr global savings
- Global interoperability
- Accident reduction
- Threat deterrence



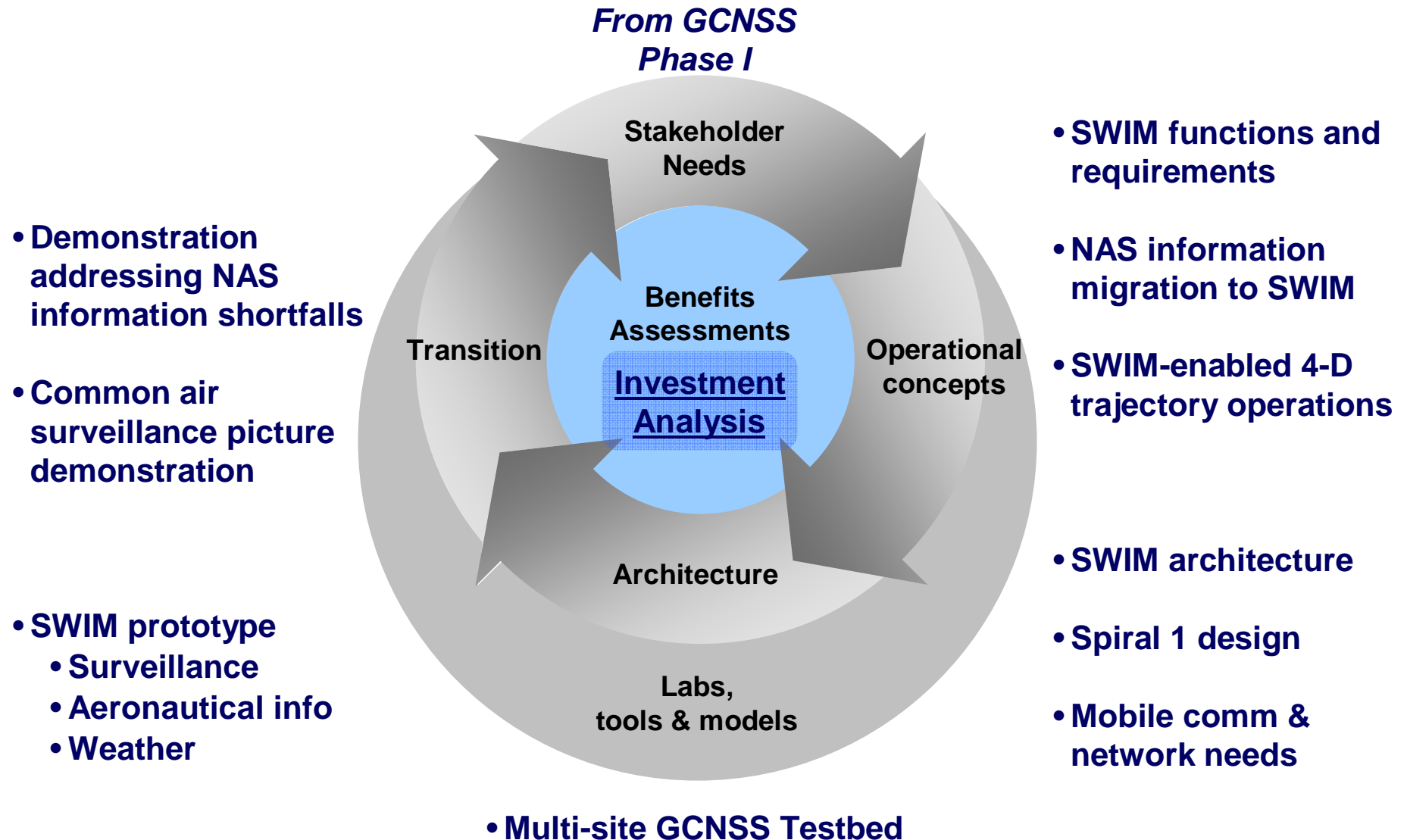
- **SWIM**
 - Technology is mature
 - High leverage on ATM efficiency and interagency coordination
 - FAA capital savings of 4% of F&E budget
 - Business case for airlines is positive (2:1)
- **Satellite-based CNS**
 - Technically feasible
 - Commercial satcom can meet requirements
 - Extends SWIM to oceanic and remote domains
- **Broadband satcom**
 - Provides video and aircraft data for security and emergencies
 - On equipped aircraft, could be usable for ATM

GCNSS II Objectives



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We Define SWIM as ...

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...a scalable, standards-based information sharing architecture that seamlessly and securely connects users with the information they need.

SWIM accomplishes this with policies, standards, infrastructure, and tools for NAS-wide information sharing.

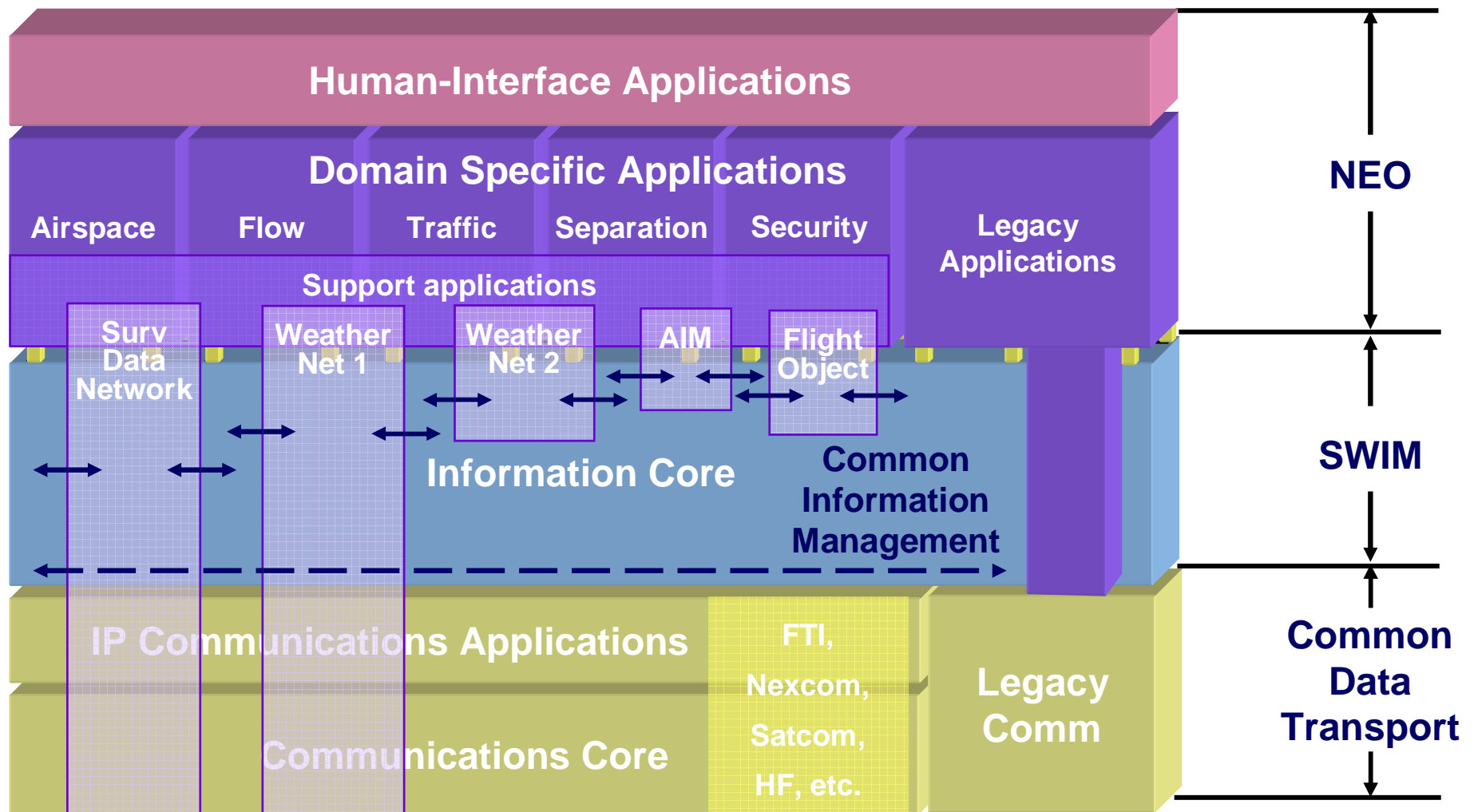
SWIM provides the NAS capability for securely accessing the right information in the right format at the right time at the right location.

NCO, SWIM, & and an Architecture Reference Model



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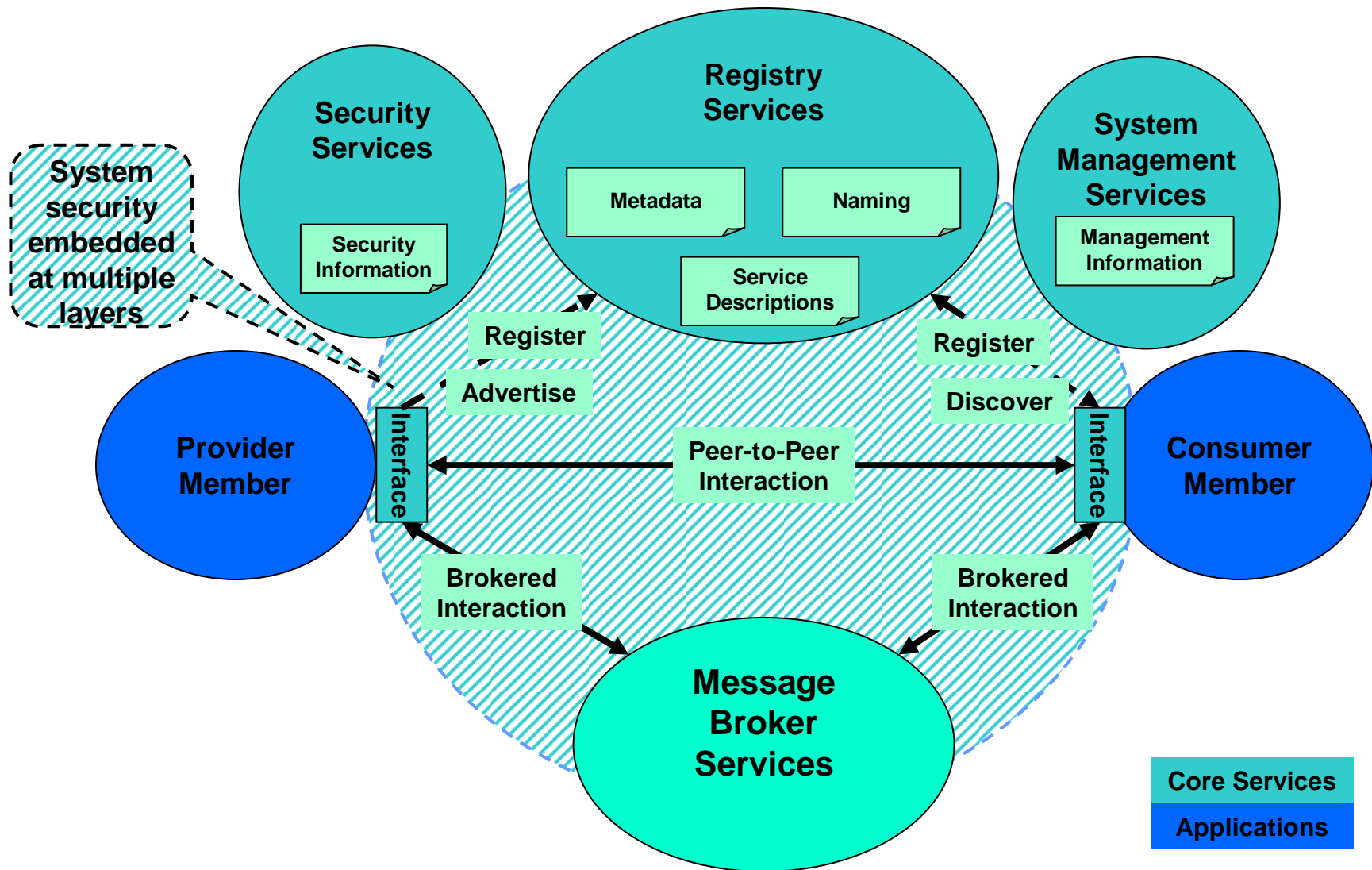


SWIM Functional View (Core Services)



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SWIM Prototype Architecture Build II Snapshot



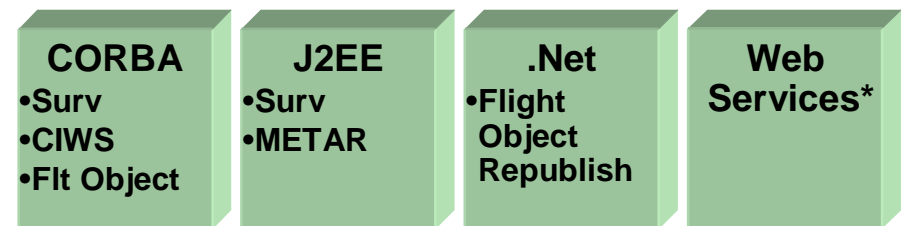
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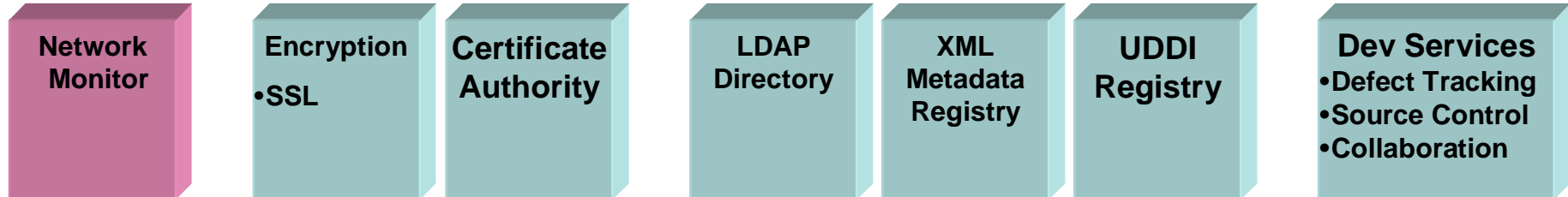
Testbed Applications



SWIM Brokers

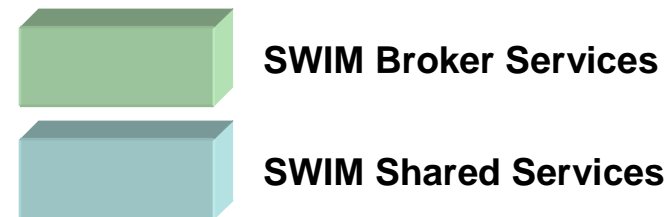
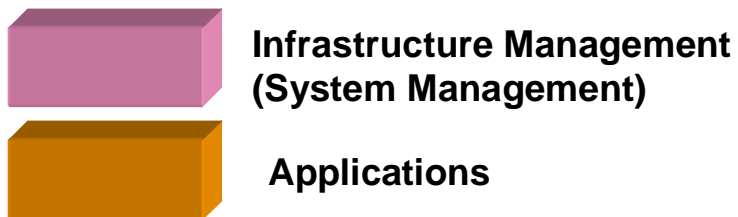


Service Bus



SWIM Security Services

SWIM Registry and Directory Services



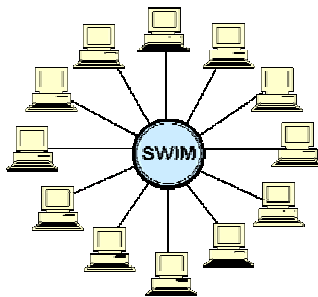
* Complete in Build III

Savings from SWIM over Application-to-Application Development

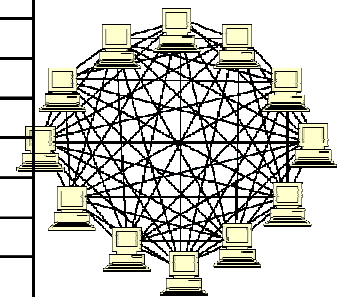


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Information Migration Candidate	Key Related System	Number of Custom Interfaces
AIM	Aeronautical Information Management	21
ECG / ERAM / CARTS / STARS / ASDE	Surveillance Data Network and ERAM	70
TFM-M	Traffic Flow Modernization	11
WARP	Weather and Radar Processor	5
ERAM	En Route Automation Modernization	5
ITWS	Integrated Terminal Weather System	4
ECG	Air Route Surveillance Radar 4	3
CARTS / STARS	Airport Surveillance Radar - Model 9, 11	6
CIWS	Corridor Integrated Weather System	3
WMSCR	Weather Message Switching Center Replacement	3
STARS	Standard Terminal Automation Replacement System	2
ASDE-X	Airport Surface Detection Equipment Model X	1
12 Systems	Totals	134



Cost per incremental SWIM interface

\$3-5M based on relative complexity to custom interface, plus significant re-use, learning, etc.

Cost per custom (App-to-App) interface

\$3-5M based on recent experience on URET/WARP WINS

If all NAS 5 operational improvements were implemented in the traditional approach, building custom interfaces would cost about \$400M - \$700M.

A SWIM approach for the 12 systems would cost an estimated \$30M - \$60M.



Benefits Rollout

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2007	2008	2009	2010	2011	2012	2013	2014	2015
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Cost Synergies with existing programs

FAA F&E Savings

Legend

-  SWIM Program Benefit
-  SWIM Enabled Benefit

Application O&M Savings

**SWIM enables operational changes that would be unaffordable without SWIM
(e.g., 4-D trajectory-based management)**

Operational Changes
Agile NAS
Shared Situational Awareness
Performance-Based Metrics
etc.

Summary



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- **SWIM enables ATM transformation**
- **Prototype connects to AIM, surveillance, & weather**
- **Significant savings over application-to-application connections**
- **Demonstration in September of common situation awareness for security operations**